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CAUSAL RELATION BETWEEN DOMESTIC SAVING AND ECONOMIC GROWTH: EVIDENCE FROM INDIAN ECONOMY

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ABSTRACT

This study empirically investigates causal relationship and the direction of causality between domestic saving and economic growth in India. The variables used for study are Gross Domestic Savings and Gross Domestic Product (as proxy of economic growth). The methodology employed is econometric models for testing long run and short run causality using three different causality tests - Likelihood ratio test, Lagrange multiplier and Wald test. Augmented Dickey-Fuller (ADF) test shows that the variables are non-stationary at levels, but becomes stationary at first differences. Long run relationship among the variables is found in cointegration test. Causality tests find uni-directional causal relation between gross domestic savings to gross domestic product in short-run and bi-directional causality in long run. Results imply that policymakers should design and implement policies that boost savings, which in turn will boost economic growth. Increase in domestic savings will solve some of the problems for Indian industry like, over dependency on foreign investment and high cost of capital.

Keywords: Gross Domestic Saving, Gross Domestic Product, Engel-Granger causality, Classical View, Keynesian hypothesis, Cointegration, Granger Causality, Likelihood ratio test, Lagrange multiplier.

1. INTRODUCTION

In underdeveloped countries when large part of the national income is saved and invested it will lead to higher output and economic development. The process of capital formation requires savings. It is through saving that resources are set aside from income and thus becomes available for production purposes. Economic growth can only happen if there is proper flow of investment. Investment helps to push economy's production possibilities curve (PPC) outward. If country can sufficiently save domestically then firms may not have to depend on foreign sources of investments. Biggest challenge for economic growth is to generate savings and channelize it to industry in form of investment. Thus, savings and economic growth have causal relation; saving

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provides a source of money to invest. Investment allows firms to buy new capital goods leading to higher output and economic growth.

The relationship between savings and economic growth is studied in many literatures like Jappelli and Pagano (1996), Sinha and Sinha (1998), and Saltz (1999) to name a few. They suggest that it is savings that promotes economic growth and not vice versa. Policymakers have advocated that higher savings will boost economic growth of countries, thus policies that boost savings should be designed and implemented. But question that may arise is whether high savings actually promote economic growth, especially for countries like India. The recent financial crisis witnessed by the East Asian countries has cast further doubt on the viability of the earlier growth models. Thus it becomes very important to investigate savings and economic growth relationship in Indian context.

2. LITERATURE REVIEW

The relation between domestic savings and economic growth is very dynamic in nature especially for developing countries. With an oblivious importance, a very little empirical research is done. The studies that talks about savings engender economic growth are Harrod-Domer growth model (Harrod, 1939) (Domer, 1946), and Solow growth model (Solo, 1956). The growth models of Harrod (1939), Domer (1946), and Solow (1956) proves in their study that increase in savings will lead to high investment by increasing the availability of funds for investment, which in turn stimulates economic growth. Higher investment leads to more formation of capital goods, which will be available for nation at its disposal to produce goods and services. Rises in employment, income and aggregate demand created by the availability of more goods and services will lead to economic growth. The direction of causal relation between economic growth and savings is in debate, literatures shows considerable debate among development economists.

Bacha (1990), DeGregorio (1992), Otani and Villanueva (1990), and Stern (1991) using ordinary least squares (OLS) procedure found that a higher growth rate of savings is associated with higher economic growth; Thus the findings are consistent with the conventional wisdom, which stipulates that domestic savings stimulate economic growth through investment. Modigliani (1970, 1990) and Maddison (1992) also found that there is a positive correlation between savings and GDP. However, recent studies by Jappelli and Pagano (1996), Gavin *et al.* (1997), Sinha and Sinha (1998), Bosworth (1993), Carrol and Weil (1994), and Saltz (1999) found evidence that economic growth Granger-causes savings. The consensus that emerges from these studies is that economic growth Granger-causes growth rate of domestic savings, suggesting that it is economic growth that promotes savings and not vice versa.

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Caroll and Weil (1994) have used five-year averages data of OECD countries and found that economic growth Granger caused savings in the larger sample. On the other hand, when time dummies were not included, savings Granger caused growth in the OECD countries. Attanasio et al. (2000) criticized Caroll and Weil's results on the robustness; they used annual data rather than the five-year average, it increased precision and statistical significance of the estimates as well as changing the pattern of causation. Sinha (1996) found evidence of causal relation from economic growth to savings in Pakistan. Further, Sinha and Sinha (1998) found that same causality from the economic growth rate to growth rate of savings in Mexico. Sinha (1999) examined the relationship between the growth rate of savings and economic growth in Sri Lanka.

Saltz (1999) argued that higher per capita income leads to higher consumption and savings rates. This study investigated the direction of causality in 17 third world countries, using the Vector Error Correction (VEC) model for eight countries and Vector Auto Regressive (VAR) model for the remaining nine countries. The study found that for nine countries the causality was from the economic growth rate to growth rate of savings. For only two countries was the direction of causality reversed. There were four countries where no causality was identified, and for the other two countries bi-directional causality was detected. The author concluded that higher growth rates of real Gross Domestic Product (GDP) contribute to a higher growth of savings. Anoruo and Ahmad (2001) investigated the causality of savings and economic growth in seven African countries using VEC. The authors found that in four out of seven countries, economic growth Granger causes the growth rate of domestic savings. However, they obtained a bi-directional causality in Cote d'Ivoire and South Africa. Only in the Congo, did the opposite result prevail: the growth rate of domestic savings Granger caused economic growth.

Studies like Mavrotas and Kelly (2001) used the Toda and Yamamoto method to test causality; using data from India and Sri Lanka. The authors found no causality between GDP growth and private savings in India. However, bi-directional causality was found in Sri Lanka. Baharumshah *et al*. (2003) investigated growth rate of savings behaviour in five Asian countries: Singapore, South Korea, Malaysia, Thailand, and Philippines. Based on time series data from 1960-1997, using VEC, the authors found that growth rate of savings does not Granger cause economic growth rate in the countries, except for Singapore.

Looking at the pool of literature available on relationship between savings and economic growth not many studies have been done in Indian context. Few studies like Seth (2011), Sinha (1997), and Mehta (2016) have studied the relation between saving and investment which will lead to capital formation and economic growth. Thus, this paper attempts to investigate in Indian context the direction of causality between economic growth and domestic saving. The data use for study is taken from the RBI's HANDBOOK OF STATISTICS 2016-17.

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Gross Domestic Savings:

Gross domestic savings (GDS) is nothing but GDP minus the consumption expenditure; it consists of savings of household sector, private corporate sector and public sector. GDS has two parts, Public Sector and Private sector. The largest segment of Private sector is the Household sector and the private corporate sector. Natural Log data of GDS is used in the study. Descriptive statistics of GDS for 62 years annual data from 1951 to 2017 is as follow:

Table 1: Gross Domestic Investment (in millions)

Mean	14502.97
Median	1435.300
Maximum	115428.0
Minimum	20.00000
Std. Dev.	29520.37
Skewness	2.354224
Kurtosis	7.178518
Observations	62

Gross domestic Product:

GDP is the final value of the goods and services produced within the geographic boundaries of a country during a specified period of time, normally a year. GDP is an important indicator of the economic performance of a country. In India, contributions to GDP are mainly divided into 3 broad sectors agriculture and allied services, industry and service sector. Natural log of GDP is used in the study. Descriptive statistics of GDP for 62 years annual data from 1951 to 2017 is as follow:

Table 2: Gross Domestic Investment (in millions)

Mean	26827.69
Median	6738.750
Maximum	151837.1
Minimum	7.000000
Std. Dev.	39660.69
Skewness	1.705471
Kurtosis	4.857615
Observations	62

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3. METHODOLOGY

In order of determining the causal relation between savings and economic growth, Toda and Yamamoto's (1995) methodology is used, which is also extended to two additional tests, namely, the likelihood ratio and the Lagrange multiplier tests (Green, 2000). In order to test the causality between two variables testing procedure is followed. When time series data is used for analysis prior examination tests to determine the properties of the data are done, notably unit roots and cointegration, which bear on the significance and direction of causality findings. If the time series are characterized by non-stationarity it is appropriate to test first for the existence of a long-run relationship between or among the variables.

It is important that the testing procedure capture the long run dynamics in the time series, properties of the data since where co-movement is present, short run divergences from the equilibrium will be counteracted by long run forces, thus reducing the risk of spurious causation results. For valid inferences, tests should therefore be undertaken on the I(0) variables. Granger (1988) shows that in the presence of cointegration there must be at least one direction of 'Granger-causality'. Causality can thus be tested by constructing a dynamic first-difference model that embeds an error correction term derived from the residuals from the static OLS regression as suggested by Engle and Granger (1987).

Engle and Granger method includes three-step procedure to test for the direction of causality. The first step tests for the order of integration of the variables in level form. If a unit root is present and stationarity is achieved by first-differencing the data, the second step is to test for cointegration using the vector auto-regression (VAR) approach of Johansen (1988, 1991) and Johansen and Juselius (1990). If cointegration is detected, the third step tests for Granger causality by applying a standard Granger test modified with an appropriate error-correction term. Assuming that the levels of all variables in real terms are I(1) and cointegrated, bivariate tests are specified as generalized extensions of the standard case (Granger 1969).

Consider the variables GDPt and GDSt, where GDPt is the gross domestic product representing economic growth taken in log form and GDSt, gross domestic savings in economy representing the surplus also taken in log form. If GDPt and GDSt are considered to be stochastic trends and if they follow a common long-run equilibrium relationship, in that case GDPt and GDSt should be cointegrated. Cointegration is a test for equilibrium between non-stationary variables integrated of the same order. According to Engle and Granger (1987), cointegrated variables must have an Error correction model (ECM) representation. The main reason for the popularity of cointegration analysis is that it provides a formal background for testing and estimating short and long run relationships among economic variables. Furthermore, the ECM

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strategy provides an answer to the problem of spurious correlations.

Error correction representation of cointegrated GDP and GDS will have following form:

$$\Delta GDP = \beta_0 + \sum_{i=1}^{p} \beta_{1,i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \beta_{2,i} \Delta GDs_{t-i} + \varphi_1 \pi_{t-1} + \varepsilon_{1t} \text{---------- (1)}$$

$$\Delta GDS = \alpha_0 + \sum_{i=1}^{p} \alpha_{1,i} \Delta GDS_{t-i} + \sum_{i=1}^{p} \alpha_{2,i} \Delta GDP_{t-i} + \varphi_2 \pi_{t-1} + \varepsilon_{2t} \text{---------- (2)}$$

Here Δ is difference operator, α's and β's are coefficients *P*'s are optimum lags of GDS and GDP, ε's are random error π's are lag values of error correction derived from cointegrating series. All the variables namely GDS and GDP are stationary. Hypothesis tested for the study are as follow:

H1: GDP does not cause GDS: If and only if $\beta_{2,i} = 0$, $\forall i$ and $\varphi_2 = 0$

H2: GDS does not cause GDP: If and only if $\alpha_{2,i} = 0$, $\forall i$ and $\varphi_1 = 0$

H3: GDS and GDP has bi-directional causality: If and only if $\beta_{2,i} = \alpha_{2,i} = 0$, $\forall i$ and $\varphi_2 = \varphi_1 = 0$.

In order to check causality three different tests are used, but asymptotically similar to Granger-causality test. First Likelihood ratio test second is Lagrange multiplier and third is Wald test. When finite sample is used in the study, like in this study carried, it is possible that three tests will yield different results even though they are asymptotically equivalent. It is also possible three tests will lead to different inferences. It is widely used and cited in many literatures. The problem of divergent results of all three tests in finite sample is difficult to solve as there is no theoretical justification available for the superiority of one test over other.

4. DATA ANALYSIS

4.1 Augmented Dickey Fuller (ADF) test:

Efficacy of VAR model for establishing the relationship among variables depends upon the stationarity of variables. Therefore, before conducting a Granger causality test based on the VAR, the time series must be stationary. If the time series is non-stationary it implies that the variables are co-integrated. This means that stationarity and co-integration test musts precede the Granger Causality test.

The ADF unit root tests following hypothesis

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H_0: Series has unit root
H_1: Series has no unit root.

Thus if the series have unit root, it implies that co-integration is necessary. The results of unit root in Table-3 using ADF test show the order of integration of the variables and presence of unit root. Both variables i.e. GDS and GDP are stationary at first difference.

Table 3: Unit Root Test -Augmented Dickey Fuller (ADF) test

Variables	Order of Integration	t-statistic & Prob.	Stationarity
GDS	I(0)	0.543203(0.9864)	Not-Stationary
GDS	I(1)	-7.740063(0.0000)	Stationary
GDP	I(0)	1.411671(0.9988)	Not-Stationary
GDP	I(1)	-4.380683(0.0011)	Stationary

4.2 Cointegration Test- Johanson Cointegration Test:

After getting the results of stationarity at I(1) order of integration, the next to be tested is proof of long run convergence between GDS and GDP. Johansen (1988), and Johansen and Juselius (1990) maximum likelihood testing procedure on the number of cointegrating vectors, which also includes testing procedures for linear restrictions on the cointegrating parameters, for set of variables was used. Two tests statistics were used to identify the number of cointegrating vectors, namely the 1) Trace Test statistic and 2) Maximum Eigen value test statistic. Table-4 shows null hypothesis of no co-integration is rejected by trace statistic and the maximum Eigen value at 1% level of significance and tests are performed with two lag lengths according to the Schwartz criterion. Thus, the results suggest that there is cointegration or long-term relationship between GDS & GDP.

Table 4: Johansen Cointegration Test:

H0: No Co-integration	Max- Eigen Statistic	Critical Value (5%)	Trace Statistics	Critical Value (5%)
GDS and GDP				
Reject	25.16354	14.26460***	34.82359	15.49471***
***, ** and * denotes statistical significance at 1%, 5% and 10% level				

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4.3 Ganger Causality Test:

In order to know the direction of causality between Indian domestic saving and GDP, growth Granger Causality Test is done. As the variables are following I(1) order of integration and are co-integrate thus we can use vector error correction model (VECM) for estimating granger causality. VECM is used instead of VAR because if each variable is not stationary, we can estimate VAR only in the first difference of the series. However, if individual variables in VAR are non-stationary at level, but are cointegrated, we can estimate VAR by taking into account the error correction term, which is obtained from the cointegrating regressions. This leads to the use VECM (Gujarati, 2011). The optimum lags length of the VECM models are decided based on Akaike information (AI) and Schwarz information (SC) criteria. Causal relation is sensitive to the selection of the lags for the model thus, the optimum lags length of the VECM models is 2 based on AI and SC and LR criteria mentioned in Table-5.

Table 5: Lag Order Selection Criteria

Endogenous variables: GDP GDS						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
1	138.6764	NA	5.62e-06	-6.413162	-6.148963	-6.352502
2	144.0789	9.775966*	5.26e-06*	-6.479948*	-6.247669*	-6.358629
3	146.4536	4.070960	5.70e-06	-6.402554	-5.906077	-6.220575*
4	147.5768	1.818532	6.58e-06	-6.265564	-5.603594	-6.022926
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Granger causality results based on VECM model and asymptotically similar causality tests like Likelihood ratio, Lagrange multiplier and Wald test is as follow in Table-6.

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Table 6: Granger Causality Tests

Direction of Causality	Null Hypothesis	Causality Tests	Statistics
Uni-directional	**GDP does not cause GDS**		4.6252
			4.2956
			3.7369
Uni-directional	**GDS does not cause GDP**		27.0068**
			54.2875***
			16.6305**
Bi-directional	**GDP does not cause GDS** **GDS does not cause GDP**		Cannot Reject H0
			Cannot Reject H0
			Cannot Reject H0
***, ** and * denotes statistical significance at 1%, 5% and 10% level.			

The results of Granger causality between GDS and GDP show unidirectional causality by all three asymptotically similar causality test i.e. Likelihood ratio, Lagrange multiplier and Wald test. Null hypothesis of GDS cannot cause GDP is rejected which leads to conclusion that GDS leads to GDP. Null hypothesis of GDP cannot cause GDS is not rejected which infers that change in GDP growth will not necessary lead to change in GDS.

4.4 Robustness tests:

In order to test the robustness of the causality test results, methodology described by Engle-Granger (1987), Granger (1988) and Granger (1991) is used based on ECM. It will allow differentiating between short run causality and long run causality. For testing short run causality we use Chi-square or F-Statistics but t-statistics can be used for testing long-run causality. This method can be used provided error of the model are independent and identically follow Gaussian distribution.

In Table-7 F-statistics report significance of null hypothesis of non-causality in short run. In addition t-statistics report significance of null hypothesis of long run non-causality. Rejection of null hypothesis infers causal relation between two variables in the long-run.

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Table 7: Temporal (Long-Run) Causality Test

Dependent Variables **Independent Variables**	**ΔGDS**	**ΔGDP**	**ε_{1t} (ψ_{1t})**
	F-statistics	**F-statistics**	**t-statistics**
ΔGDS	_	23.2831***	-0.4325**
ΔGDP	4.2819	_	-1.6564**
***, ** and * denotes statistical significance at 1%, 5% and 10% level. All variables are in first difference except error correction term.			

Results in Table-7 shows that in short run there is uni-directional causal relation between domestic saving and gross domestic product (change in GDS will cause change in GDP). However, in long run, change in GDS will lead to change in GDP and vice-versa. We can infer that in long run bi-directional causal relation between GDP and GDS.

5. CONCLUSION

This paper has tried to empirically examine the causal relation between gross domestic saving and economic growth in India. The analysis based on 62 years annual logarithmic data of GDS and GDP can be summarized as:

Preceding causality tests, the stationarity of the data is checked using ADF unit root test. It show that both the series GDS and GDP gets stationary at I(1) level of integration. Johansen cointegration revealed that there is long-run relationship among the variables. In order to check causal relationship between savings and economic growth asymptotically similar to Granger-causality tests i.e. Likelihood ratio test, Lagrange multiplier and Wald test are used. Granger-causality tests clearly support the evidence of a uni-directional causal link between GDS and GDP in India (GDS causes GDP). It rejects any feedback or bi-directional causality between GDS and GDP in short run. In order to check the robustness of causality results and also to investigate long run causality t-statistics was used; test results confirms long-run bi- directional causal relation between GDS to GDP.

Policymakers should design and implement policies that boost savings, which in turn will enhance economic growth of countries. Policy should boosts savings by motivating people to save more in schemes like Fixed Deposit (FD), Personal Provident Funds (PPF), National Saving Certificates (NSCs) etc. will be more effective and important in short run. However, in long run

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saving will not be the problem due to stable economic growth, employment and general price levels. Moreover savings is most important and integral source of capital formation process of India. Boosting savings may solve two major problems for Indian industry like, over dependency on foreign capital, high cost of capital due to lack of availability of surplus funds. Thus, the role of organizations like National Savings Institute (NSI) will be very important. NSI works under Department of Economic Affairs, Ministry of Finance, and Government of India. The Institute is entrusted and will help in mobilization of savings in National Savings Schemes (NSS) of Government of India, operated through Post Offices and selected branches of Banks throughout the country.

Promotion of NSS by government of India will help to increase savings as it provides complete security of investment, offer attractive rate of interest and are available to the investors through about 1,56,000 Branches of Post Office Savings Bank. These savings schemes are very popular among the masses due to their attractive features. According to report of NSI 2017, gross collections in NSS during the year 2012-13 were Rs. 1,96,721.19 crore, excluding collections made in Public Provident Fund and Senior Citizen's Savings Scheme by the banks.

Further to facilitate the work of popularization of NSS and securing investment from the public, authorized agents appointed by the State Governments will help in spreading awareness and mobilization of surplus funds from different states. For example Mahila Pradhan Kshetriya Bachat yojana Agency is meant for women agents only who canvas and secure deposits under 5 Year Recurring Deposit account and Standardised Agency System agents promote and secure investment for other savings schemes. To make savings easy and automatic for salaried people, Pay Roll Savings Group will help in public and private sector establishments to save regularly and directly from their salaries. Extra Departmental Branch Post Masters help mobilizing savings in rural areas. To inculcate the habit of thrift among the students, School Savings Banks called 'Sanchayikas' are established in schools. NSI provides support by way of training, guidance and motivation to these extension agencies. Savings being very powerful internal source of growth should be harnessed by economies like India.

REFERENCES

1. Anoruo E., and Ahmad, Y., 2001, Causal Relationship between Domestic Savings and Economic Growth: Evidence from Seven African Countries, African Development Bank, Blackwell Publishers, Oxford.
2. Attanasio, O.P., Picci, L., and Scorcu, A.E., 2000, Saving, Growth, and Investment: A Macroeconomic Analysis Using a Panel of Countries, The Review of Economics and Statistics, Vol. 82, No.2:182-211.

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3. Bacha, E.L. (1990), 'A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries', Journal of Development Economics, Vol. 32, pp. 279–96.
4. Baharumshah et al., 2003, Savings Dynamic in Asian Countries, Journal of Asian Economics, 13: 827-845.
5. Bosworth, B.P. (1993), 'Saving and Investment in Global Economy', Brookings, Washington DC.
6. Carroll, C. and D. Weil (1994), 'Saving Behavior in Ten Developing Countries', Carnegie Rochester Conference Series on Public Policy, Vol. 40, North-Holland, Amsterdam.
7. DeGregorio, J. (1992), 'Economic Growth in Latin America', Journal of Development Economics, Vol. 39, pp. 59–84.
8. Domer, E.D. (1946), 'Capital Expansion, Rate of Growth, and Employment', Econometrica, Vol. 14, pp. 137–47.
9. Gavin, M., R. Hausmann and E. Talvi (1997), 'Saving Behavior in Latin America: Overview and Policy Issues', in R. Hausmann and Reisen R. (eds.), Promoting Savings in Latin America, OECD and Inter-America Development Bank, Paris.
10. Granger, C.W.J. (1969), Investigating causal relations by econometric models and cross pectral methods, Econometrica, Vol. 37, July: 424-38
11. Granger, C.W.J., Newbold,P (1974), "Spurious Regression in Econometrics" ,Journal of Econometrics.
12. Greene,W.(2003), Econometric Analysis, 3th ed, EnglewoodCliffs, N.J.: Prentice Hall.
13. Gujarati, D. (2011). Econometrics By Example. Palgrave Macmillian.
14. Harrod, R. (1939), 'An Essay in Dynamic Theory', Economic Journal, Vol. 49, pp. 14–33.
15. Jappelli, T. and M. Pagano (1996), 'The Determinant of Saving: Lessons from Italy', paper presented at the Inter-America Development Bank Conference on Determinants of Domestic Saving in Latin America, Bogota, Colombia.
16. Johanson, S and K, Joselius (1990), Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money, Oxford Bulletin of Economics and Statistics, 52: 169-210
17. Johanson, S. (1988), Statistical Analysis of Co-integrating Vectors, Journal of Economic Dynamics and Control, 12: 231-254.
18. Maddison, A. (1992), 'A Long Run Perspective on Saving', Scandinavian Journal of Economics, Vol. 94, pp. 181–96
19. Mavrotas, G. and Kelly, R., 2001, Old Wine in New Bottles: Testing Causality between Savings and Growth, The Manchester School, Vol.69: 97-105.

ISSN: 2455-8834

Volume:03, Issue:08 "August 2018"

20. Mehta, D. (2016). Behaviour of Indian Saving & Investment: An Empirical Investigation of Keynesian and classical Debate. ANVESH Doctoral Conference in management .
21. Modigliani, F. (1970), 'The Life Cycle Hypothesis of Saving and Inter-country Difference in Saving Ratio', in W.A. Eltis, M.F. Scott and J.N. Wolfe (eds.), Induction, Trade and Growth: Essays in Honor of Sir Roy Harrod, Clarendon Press, London.
22. Modigliani, F. (1990), 'Recent Development in Saving Rates: A Life Cycle Perspective', Frisch Lecture, Sixth World of Congress of the Econometric Society, Barcelona, Spain.
23. Otani, I. and D. Villanueva (1990), 'Long-term Growth in Developing Countries and Its Determinants: An Empirical Analysis', World Development, Vol. 18, pp. 769–83.
24. Reserve Bank of India. (2016-17). Handbook of Statistic. Government of India.
25. Saltz, I.S. (1999), 'An Examination of the Causal Relationship Between savings and Growth in the Third World', Journal of Economics and Finance, Vol. 23, pp. 90–98.
26. Seth, B. (2011). Long Run and Short Run Saving Investment Relationship in India. RBI working Paper series .
27. Sinha, D. (1997). Saving-Investment Relationship In Japan And Other Asian Countries. Asia Pacific conference proceedings .
28. Sinha, D., and Sinha, T., 1996, The Role of Saving in Pakistan's Economic Growth, The Journal of Applied Business Research, Vol. 15: No 1.
29. Sinha, D., and Sinha, T., 1998, Cart Before Horse? The Saving-Growth Nexus in Mexico, Economics Letter, 61: 43-47.
30. Sinha, D., and Sinha, T., 1999, Saving and Economic Growth in Sri Lanka, Indian Journal of Applied Economics, Vol. 8 No. 3 163-174.
31. Sinha, D., and Sinha, T., 2000, Tests of Granger Causality Between Saving and Economic Growth in the Philippines, Journal of Social and Economic Development, Vol. II, No 2.
32. Solow, R.M. (1956), 'A Contribution to the Theory of Economic Growth', Quarterly Journal of Economics, Vol. 70, pp. 65–94.
33. Stern, N. (1991), 'The Determinants of Growth', Economic Journal, Vol. 101, pp. 122–33.
34. Toda HY, Phillips PCB (1993) Vector autoregression and causality. Econometrica 61:1367 1393
35. Toda HY, Phillips PCB (1994) Vector autoregression and causality: a theoretical overview and simulation study. Econometric Reviews 13:259–285
36. Toda HY, Yamamoto T (1995) Statistical inference in vector autogression with possibly integrated processes. Journal of Econometrics 66:225–250

